

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RODGER A. RIEHM

Appeal No. 1998-0558
Application 08/564,942

ON BRIEF

Before KIMLIN, GARRIS and JEFFREY SMITH, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 2-5, 8, 23-26 and 30-34, all the claims remaining in the present application. Claims 23 and 32 are illustrative:

23. A process for isomerizing a C₈ alkyl aromatic hydrocarbon-containing feedstock comprising the steps of:

- (a) providing a catalyst including at least one metal component;
- (b) activating the catalyst by:

(1) oxidizing the metal component of said catalyst in a reactor by circulating a stream of nitrogen containing about 1 percent by volume of oxygen across said catalyst while increasing the temperatures from ambient up to about 480°C;

(2) maintaining the circulating stream of nitrogen containing about 1 weight percent oxygen at a temperature of about 480°C until the metal component of said catalyst is completely oxidized;

(3) stopping the circulating stream and depressurizing the reactor;

(4) purging the reactor with pure hydrogen at atmospheric pressure;

(5) circulating pure hydrogen through the reactor over a range of conditions from about 340°C and atmospheric pressure to about 315°C and 12 kg/cm²g; and

(6) stabilizing the catalyst by injecting ammonia into the reactor;

(c) contacting the feedstock in at least one isomerization zone with the catalyst and being effective to promote C₈ alkyl benzene isomerization at isomerization conditions in the presence of hydrogen at isomerization conditions to isomerize at least a portion of the C₈, alkyl aromatic hydrocarbons and to produce an effluent;

(d) separating the effluent to form a hydrogen-rich fraction, a first hydrocarbon-rich fraction

containing benzene and toluene and having a lower average molecular weight relative to C₈ alkyl aromatic, and a second fraction enriched in C₈, alkyl aromatic content relative to the effluent;

(e) subjecting at least a portion of the first hydrocarbon-rich fraction to the contacting of step (c); and

(f) recovering at least one C₈, alkyl aromatic product from the second fraction.

32. A process for isomerizing a C₈, alkyl aromatic hydrocarbon-containing feedstock comprising the steps of:

(a) providing a catalyst including at least one metal component;

(b) activating the catalyst;

(c) contacting the feedstock in at least one isomerization zone with the catalyst and being effective to promote C₈, alkyl benzene isomerization at isomerization conditions in the presence of hydrogen at isomerization conditions to isomerize at least a portion of the C₈ alkyl aromatic hydrocarbons and to produce an effluent;

(d) separating the effluent to form a hydrogen-rich fraction, a first hydrocarbon-rich fraction containing benzene and toluene and having a lower average molecular weight relative to C₈ alkyl aromatic, and a second fraction enriched in C₈ alkyl aromatic content relative to the

Appeal No. 1998-0558
Application No. 08/564,942

effluent;

(e) subjecting at least a portion of the first hydrocarbon-rich fraction to the contacting of step (c);

(f) increasing system pressure of the hydrogen rich fraction, said hydrogen rich fraction having vaporous light hydrocarbon impurities, said increase in system pressure

high enough to cause a phase change in the vaporous light hydrocarbon impurities from a vapor to a liquid phase, whereby said phase change causes an increase in hydrogen purity in the recycle stream; and

(g) recovering at least one C₈ alkyl aromatic product from the second fraction.

The examiner relies upon the following references as evidence of obviousness:

Riehm	4,139,571	Feb. 13, 1979
Berger, et al. (Berger)	3,553,276	Jan. 05, 1971
Yamasaki et al. (Yamasaki)	4,300,014	Nov. 10, 1981

Appellant's claimed invention is directed to a process for isomerizing a C₈ alkyl aromatic hydrocarbon-containing feedstock, such as one containing ethylbenzene, to produce compounds such as paraxylene, although none of the appealed

Appeal No. 1998-0558
Application No. 08/564,942

claims recite ethylbenzene or paraxylene. The process of claim 23 calls for activating the catalyst by first oxidizing the metal component of the catalyst with a circulating stream of nitrogen and 1 percent oxygen, purging the reactor with pure hydrogen, and circulating pure hydrogen through the reactor at the recited conditions of temperature and pressure. Appealed claim 32, on the other hand, does not define any particular conditions for activating the

catalyst, but provides for separating the effluent from the reactor into a hydrogen-rich fraction, a hydrocarbon-rich fraction containing benzene and toluene, and a second fraction enriched in C₈ alkyl aromatic content.

Appellant submits at page 7 of the principal brief that the appealed claims "do not stand or fall together for the reasons set forth below." However, although appellant presents separate arguments for claims 32-34, appellant has advanced no arguments that are reasonably specific to any of claims 2-5, 8, 23-26, 30 and 31. Accordingly claims 2-5, 8,

Appeal No. 1998-0558
Application No. 08/564,942

23-26, 30 and 31 stand or fall together. In re Nielson, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987). See also 37 CFR 1.192 c(7) and c(8) (1997).

Appealed claims 2-5, 8, 23-26, 30 and 34 stand rejected under 35 U.S.C. § 103 as being unpatentable over Riehm or Berger or the admitted prior art in view of Yamasaki, or Yamasaki, taken alone, or in view of Riehm.

We have thoroughly reviewed appellant's arguments for patentability, as well as the declaration evidence relied upon in support thereof. However we are in complete agreement with the

examiner that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the examiner's rejection for essentially those reasons expressed in the answer.

Appellant's specification characterizes the present

invention as an improvement over the C₈ alkyl aromatic hydrocarbon isomerization disclosed by Riehm (page 3 of specification, lines 19-24) "by limiting the temperature of the reduction step in the activation of the catalyst to no more than 340 degrees celsius" to attain reduced xylene ring loss during the process (page 3 of the specification, lines 13-15). Accordingly, appellant does not dispute the examiner's factual determination that Riehm, Berger and the admitted prior art teach a process for isomerizing C₈ alkyl-aromatic hydrocarbons by contact with a hydrogenation-dehydrogenation catalyst comprising a Group VIII metal such as palladium or platinum in the presence of hydrogen, as well as separating the effluent from the reactor to hydrogen-rich and hydrocarbon-rich fractions and recycling an

aromatic-rich fraction back to the isomerization zone.

While the examiner recognizes that Riehm, Berger and the admitted prior art do not disclose appellant's activation of the catalyst

by oxidation and reduction steps, it is the examiner's position that Yamasaki, who is also directed to the isomerization of a C₈ alkyl aromatic hydrocarbon-containing feedstock to produce paraxylene, evidences the obviousness of appellant's catalyst activation procedure. We are in total accord with the examiner's analysis of Yamasaki and the conclusion of obviousness based thereof.

Yamasaki, at column 7, lines 19-44, discloses activation of the catalyst by first oxidizing it in an nitrogen atmosphere at a temperature preferably in the range of 200° to 600° C, which range totally encompasses the upper half of the claimed increasing temperature range of from ambient up to 480°C. Also, the reference teaches that, prior to use, the catalyst is subjected to a reducing atmosphere of hydrogen at a temperature preferably in the range of 250° to 550°C, which temperature range also embraces the claimed temperature of 340°C. Moreover,

Yamasaki discloses a regeneration, or re-activation, of the

catalyst which meets the presently claimed conditions of activation (see Yamasaki at column 8, lines 64, et seq., particularly column 9, lines 66 - column 10, line 24).¹

Yamasaki discloses that the oxidation step should include a continuous raising of the temperature in step wise fashion, and following the oxidation of palladium to palladium oxide, the system is purged with nitrogen and the palladium oxide is reduced to palladium with hydrogen gas at a temperature preferably in the range of 300 to 500°C under atmospheric or elevated pressure (column 11, lines 62 et seq.). Again, Yamasaki's treatment conditions during reduction totally encompass appellant's claimed temperature and pressure. Accordingly, based on the teachings of the prior art, we find that the examiner has established a prima facie case of obviousness for the claimed subject matter.

Appellant points out at page 10 of the principal brief that Yamasaki "discloses a process for the simultaneous isomerization of xylenes and the de-ethylation of ethylbenzene." However,

¹We find that the claimed activating step is not distinguishable from, i.e., reads on, regeneration or re-activation.

Appeal No. 1998-0558
Application No. 08/564,942

appellant's claims presently on appeal do not preclude such processes, i.e., the claims are sufficiently broad to encompass

them. Appellant also contends that Yamasaki "teaches away from the use of platinum with the zeolite base in order to prevent severe operating conditions which would require increased regeneration of the catalyst" (page 11 of the principal brief, first sentence.) However, as noted by the examiner, this argument is not germane to the claimed subject matter inasmuch as independent claims 23 and 32 broadly define "a catalyst", and claim 2 recites Group VIII metal components which includes both palladium and platinum.

Appellant also maintains that Yamasaki "expressly teaches away from the isomerization of ethylbenzene and, in contrast to the invention, promotes the de-ethylation of the ethylbenzene component of the hydrocarbon feedstock." (page 12 of principal brief, lines 4-6). Again, this argument is not germane to the subject matter on appeal since, as noted above, not one of the appealed claims requires the isomerization of ethylbenzene. The appealed claims broadly define a process

Appeal No. 1998-0558
Application No. 08/564,942

which may include

Yamasaki's isomerization of xylenes and de-ethylation of ethylbenzene.

As for separately argued claims 32-34, we fully concur with the examiner that the processes defined by the appealed claims would have been obvious to one of ordinary skill in the art in view of the state of the prior art. Although appellant maintains at page 13 of the principal brief that claims 32-34 "are directed to maintaining the positive activity of the catalyst during the isomerization process", the claims fail to recite any such maintenance of catalyst activity. As explained by the examiner, Riehm expressly teaches that the hydrogen-rich fraction from the effluent can be recycled to the isomerization zone, and that the remainder of the effluent is processed by a gas separation zone for obtaining other hydrocarbon products (column 2, lines 34 et seq.). We agree with the examiner that it would have been obvious for one of ordinary skill in the art, namely, a process engineer, to

Appeal No. 1998-0558
Application No. 08/564,942

increase the pressure of the hydrogen-rich fraction by regulating a hydrogen makeup stream and by eliminating a vapor purge of the hydrogen-rich fraction.

Appellant relies upon a declaration by the present inventor as evidence of nonobviousness, i.e., unexpected results.

However, we agree with the examiner that the probative value of

appellant's declaration is considerably less than that required to establish unexpected results for processes within the scope of the appealed claims. For one, the declaration evidence is hardly commensurate in scope with the degree of protection sought by the appealed claims. In re Grasseli, 713 F.2d 731, 743, 218 USPQ 769, 778 (Fed. Cir. 1983); In re Clemens, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA 1980).

The declaration fails to establish that the myriad of reactions encompassed by the appealed claims would, as a class, demonstrate unexpectedly low aryl ring loss. In re

Appeal No. 1998-0558
Application No. 08/564,942

Landgraf 436 F.2d 1046, 1050, 168 USPQ 595, 597 (CCPA 1971).

Also, and most significantly, it is not clear from the declaration that the example offered for comparison is fairly representative of activation and regeneration processes disclosed by Yamasaki. For instance, EXAMPLE 2 of Yamasaki reduces the catalyst in a stream of hydrogen at 350°C and atmospheric pressure, whereas appellant

claims a hydrogen reduction at 340°C and atmospheric pressure.

While page 4 of the declaration states that "[t]he fourth case is a balance made from the data given for the Yamasaki patent", it is not clear that the declaration presents a comparison with the closest prior art which entails a hydrogen reduction of the catalyst at 350°C under atmospheric pressure. Also, appellant has not provided convincing evidence that the 2.63 percent xylene loss exemplified by Yamasaki at TABLE 1 is invalid. Furthermore, appellant has not explained in the declaration

Appeal No. 1998-0558
Application No. 08/564,942

why one of ordinary skill in the art would have considered the results in accordance with the present invention truly unexpected. In re Merck & Co., 800 F.2d 1091, 1099, 231 USPQ 375, 381 (Fed. Cir. 1986). In re Klosak, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972).

In conclusion, based on the foregoing, the examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN)
Administrative Patent Judge)

Appeal No. 1998-0558
Application No. 08/564,942

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Appeal No. 1998-0558
Application No. 08/564,942

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